REMARKS

This amendment is responsive to the Final Office Action issued March 17, 2010. Reconsideration and allowance of claims 1-16 are requested.

The Office Action

Claims 1 and 13 stand rejected under 35 U.S.C. § 102 over Shimauchi (US 5,661,813).

Claims 2-6 and 14-16 stand rejected under 35 U.S.C. § 103 over Shimauchi in view of Snyder (US 6,287,328).

Claims 7-12 stand rejected under 35 U.S.C. § 103 over Snyder in view of Shimauchi.

The Present Amendment Should Be Entered

The present amendment amends claim 10 to address the Examiner's objection to claim 10.

Because this amendment places the application in better condition for appeal or places claim 10 in condition for allowance, it is submitted that this amendment should be entered.

The amendment to claim 10 raises no issues that would require further search or consideration. Moreover, claim 10 does not contradict claim 7. Claim 10 called for providing an alarm indication when either of the event signals crossed a preset threshold value even though no artifact was defected in either event signal. In a patient monitoring system, this alarm indication might be in response to a pulse rate signal exceeding a high level threshold or falling below a low level threshold. Other warnings concerning signals indicative of physiological activity in the patient might similarly trigger an alarm even when no artifact is detected.

An early indication that this amendment has been entered is requested.

The Claims Distinguish Patentably Over the References of Record

The Examiner asserts that claim 1 is anticipated by the acknowledged prior art (APA) described at column 2, lines 9-37 of Shimauchi. First, it is submitted

that the Examiner should cite the prior art to which Shimauchi is referring rather than Shimauchi's abbreviated synopsis of it.

The **Shimauchi** acknowledged prior art (APA) describes a relatively feedback circuit. Shimauchi generates an estimated echo path vector $\hat{h}(k)$ which is used with the received signal x(k) in order to generate an estimated echo vector $\hat{y}(k)$. Subtraction node **21** subtracts the estimated echo $\hat{y}(k)$ and the actual echo y(k) to generate a residual echo signal e(k). If the estimated echo path vector $\hat{h}(k)$ is correct, the echo signal e(k) will, of course, be zero. If it is not, the residual echo signal e(k) is used to iteratively adjust the estimated echo path vector $\hat{h}(k)$ such that it gradually converges toward a true echo path vector h(k) (column 2, lines 33-34).

In the Shimauchi acknowledged prior art (APA), it is unclear what signals the Examiner is interpreting as the two event signals. The estimated echo path vector $\hat{h}(k)$ appears to be generated based on the input signals x(k). It is unclear in the Shimauchi APA how the estimated echo path vector $\hat{h}(k)$ is generated or if matrices are involved. If the Examiner is interpreting the output signal y(k) of the microphone **16** as an event signals, it is unclear what the second event signal is. As described in the Shimauchi APA, only the current output signal y(k) is used to adjust the estimated echo path vector $\hat{h}(k)$. There is no second signal. Moreover, the output signal y(k) is subtractively combined with an estimated output signal $\hat{y}(k)$ to generate a residual echo signal e(k). It is clear that no matrix is generated based on the output signal y(k).

If a matrix is generated from the input signal x, such matrix must be based on the input signal at different samplings in time x(k), x(k-1), ... Leaving aside the question of whether sampling the same signal at different periods in time is two signals, whatever matrix might be formed describes x(k) over a single period of time. There is no disclosure of generating two matrices over two different periods of time, much less how one could operate on matrices generated by the received signal x(k) in order to determine a residual echo signal e(k). Shimauchi does not generate a global correlation matrix and a local correlation matrix based on the input signal x(k).

Because the estimated echo vector $\hat{h}(k+1)$ is estimated based on the previous estimated echo path vector $\hat{h}(k)$ plus a factor based only on the received signal x(k), (see Equation 5), it is submitted that the output signal y(k) of the

microphone must not be one of the two event signals as applied by the Examiner.). Shimauchi does not generate a global correlation matrix and a local correlation matrix based on the output signal y(k).

Clarification as to how Shimauchi is being applied is requested.

Claim 1 calls for a controller which determines a global correlation matrix, a local correlation matrix, a correlation vector, an average correlation vector, and whether an artifact was detected in one of the event signals. The Examiner asserts that the echo cancellers $\mathbf{22_M}$ of the Shimauchi APA correspond to the claimed controller. The Examiner refers the applicant to column 2, lines 9-37 which describe the Shimauchi APA. But, this paragraph does not describe a global correction matrix for two event signals over a first period of time in addition to a local control matrix for at least two event signals over a second period of time which is shorter than the first period of time. The Examiner asserts that the Shimauchi APA echo cancellers determine a correlation between previously received signals and a correlation between current received signals. The Examiner does not assert that the Shimauchi APA discloses a global correlation matrix or a local correlation matrix, and rightfully so. For example, the current received signals x(k) would be only a single event signal. The Examiner has not identified a second event signal. Moreover, the Examiner has failed to point to two matrices which sample the two (or more) event signals over different periods of time.

The Examiner refers the applicant to column 2, lines 9-37 of Shimauchi which describe the Shimauchi APA and to Figure 6 which describes a first embodiment (column 13, line 31 of the Shimauchi invention). While the Examiner can combine the Shimauchi invention with prior art to Shimauchi, it is submitted that the Examiner must explain how he is proposing to modify the prior art based on the first embodiment of the Shimauchi invention. Moreover, it is submitted that 35 U.S.C. § 103 must be used to combine the invention of reference with other prior art. When a rejection is based on a combination of the invention of a primary reference and prior art to that reference, it is submitted that a rejection under 35 U.S.C. § 102 cannot stand.

Claim 1 calls for the controller to determine a correlation vector indicative of a deviation between the local correlation matrix and the global

correlation matrix. By distinction, the Shimauchi APA determines an error, particularly a residual echo signal e(k), between the estimated echo $\hat{y}(k)$ and the output y(k) at a subtraction node **21**. Neither the estimated echo signal $\hat{y}(k)$ nor the output signal y(k) are matrices. Moreover, the residual error signal e(k) of Equation (4) in line 22 of the Shimauchi APA is not described as a vector. This further emphasizes that the echo canceller $\mathbf{22_M}$ of the Shimauchi APA does not generate a global correction matrix, nor does it generate a local correction matrix.

Claim 1 further calls for the controller to determine the average of the correlation vector. The Examiner refers the applicant to the normalized least means square algorithm discussed in the Shimauchi APA. However, the normalized least means square algorithm in the Shimauchi APA is used with the received signal vector x(k) at time k and residual echo e(k), i.e., the error attained by subtracting the estimated error signal from the output signal which is used to calculate an estimated echo path vector $\hat{h}(k+1)$ which is used at the next time (k+1) (Shimauchi, column 2, lines 16-25).

Claim 1 further calls for the controller to determine whether an artifact was detected in one of the at least two event signals from the correlation vector and the average of the correlation vector. The Examiner does not assert that the Shimauchi APA determines an artifact from at least one of the two event signals from (1) the correlation vector and (2) the average of the correlation vector. Indeed, it is submitted that nowhere in the Shimauchi APA is there any disclosure of using a correlation vector and an average correlation vector for any purpose, much less to determine whether an artifact was detected.

Accordingly, it submitted that **claims 1 and 13**, and **claims 2-6 and 14-15 dependent therefrom** are not anticipated by Shimauchi and are in condition for allowance.

Claim 3 calls for at least two signals to be monitored patient data signals. Shimauchi is concerned with hands-free communication systems in which the microphone picks up echoes from the speaker and causes the generation of howling (column 1, lines 19-23). To prevent this howling, Shimauchi uses acoustic echo cancelling (column 1, lines 24-28).

While **Snyder** may show a patient monitoring system, it is submitted that there is no teaching as to why one should try to adapt the Shimauchi acoustic echo cancelling technique to monitored patient data signals in a patient monitoring system like that of Snyder. In particular, the Examiner has failed to show where in Snyder, Shimauchi, or the combination thereof there is any suggestion that there is an echo problem in the transmission of monitored patient signals in the Snyder or other patient monitoring systems which would lead one of ordinary skill in the art to try to correct the patient data signals of Snyder with the telecommunication echo cancellation technique of Shimauchi.

Accordingly, it is submitted that **claims 3 and 15** distinguish patentably and unobviously over Shimauchi in combination with Snyder.

Claim 4 calls for a controller to repeatedly determine a correlation between at least two event signals over a longer and shorter period of time. It appears that the Examiner is asserting that the determination of the global correlation over the longer period of time is what is used to generate the estimated echo path vector $\hat{h}(k)$. While the applicants disagree, it is submitted that using a controller to repeatedly determine the local correlation between the two event signals over the shorter period of time is clearly missing.

As emphasized in the next paragraph of claim 4, which calls for the controller to repeatedly determine a current deviation between the local correlation and the global correlation, the residual echo signal e(k) is not a deviation between a local correlation and a global correlation, but is rather the subtracted difference between an estimated echo and an actual echo.

Claim 4 further calls for the controller to determine whether an artifact is detected in one of the two signals based on the difference between the current deviation and an average deviation. By contrast, in Shimauchi, the error signal e(k) is based on the difference between the estimated echo and the actual echo signal. Shimauchi does not disclose making a determination based on a difference between a current and an average deviation.

Claim 4 further calls for an alarm indicator which is triggered if at least one of the event signals crosses a preset threshold value and the controller determines that no artifact was detected. It is unclear what the Examiner is interpreting the two

event signals of Shimauchi. If the Examiner is interpreting the input signals x(k) as the two event signals, then it is unclear what property of the input signal one would want to trigger an alarm. Similarly, it is unclear what property of the output signal y(k) crossing what threshold one would want to create an alarm. There is no suggestion in Shimauchi nor Snyder that one should generate an alarm if the input signal gets too loud or too soft, or why one would want such an alarm, nor is there any suggestion of what other parameter of the input signal one would want to generate an alarm when it crossed the threshold. Similarly, it is submitted that triggering an alarm in response to the residual echo signal e(k) crossing a threshold is counterproductive. Shimauchi is trying to minimize the residual echo signal e(k) to eliminate howling, i.e., extraneous distracting noise. If one were to modify Shimauchi to generate an alarm in response to some property of the residual echo signal crossing a threshold, then it is submitted that such an alarm, like the howling which Shimauchi is trying to avoid, would be a distraction to the listener. Rather, it is submitted that Shimauchi teaches against generating alarms which would interfere with the listener's reception and understanding of the received telecommunication signal.

Accordingly, it is submitted that **claim 4** distinguishes patentably over the references of record.

Claim 7 is directed to a method of detecting a signal artifact in event signals. The Examiner's primary reference, Snyder, generates patient data signals. There is no showing or disclosure in Snyder that the patient data signals have an acoustic echo problem. Shimauchi is directed to correcting acoustic echo problems (column 1, lines 19-28). Because there is no recognized acoustic echo problem in the patient monitors of Snyder, it is submitted that those of ordinary skill in the art would not try to combine the acoustic echo cancelling techniques of Shimauchi with the patient monitor system of Snyder.

Moreover, claim 7 describes how one determines whether an artifact is detected in one of the two event signals. Again, it is submitted that there is no recognized acoustic echo problem with the patient data signals of Snyder. Moreover, Shimauchi cancels the acoustic echo. Even if one were to interpret the residual echo signal e(k) of Shimauchi as an artifact, it is submitted that there is no analogous

artifact in Snyder to cancel. Snyder does not suggest cancelling such artifacts in the patient data.

Further, as discussed above, the claimed error cancellation technique of Shimauchi is different from the claimed technique for determining whether an artifact is present.

Moreover, claim 7 calls for triggering an alarm in response to determining that an artifact was detected. The Shimauchi echo cancellation technique is not a technique which generates alarms in response to detecting echoes. Rather, the Shimauchi technique is used to cancel the echoes.

Accordingly, it is submitted that **claim 7** and **claims 8-12 dependent therefrom** distinguish patentably and unobviously over the references of record.

Other Matters

It is submitted that the arguments of Amendment E comply with 37 CFR § 1.111(b). Amendment E concisely pointed to differences between the limitations of claim 1 and the allegedly anticipatory Shimauchi reference.

The failure to address the double-patenting rejection in Amendment E is now moot because the double-patenting rejection has been withdrawn. Because there is no double-patenting rejection made in the Final Rejection of March 17, 2010, there is no double-patenting issue to address in the present amendment.

Request for Clarification

It is submitted that the issues on appeal will be better focused for the Board to review if the Examiner would clearly identify exactly which elements of Shimauchi the Examiner is asserting corresponding to each of the following elements of claim 1:

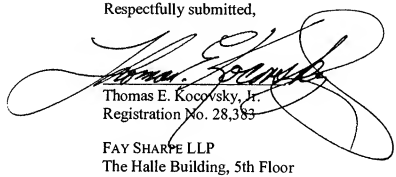
1. the first event signal,
2. the second event signal,
3. the global correlation matrix,
4. the local correlation matrix, and
5. the correlation vector.

CONCLUSION

For the reasons set forth above, it is submitted that claims 1-16 are not anticipated by and distinguish patentably over the references of record. An early allowance of all claims is requested.

In the event the Examiner considers personal contact advantageous to the disposition of this case, the Examiner is requested to telephone Thomas Kocovsky at 216.363.9000.

Respectfully submitted,



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